CLAIMS

1. An optical communication system including an optical communications route comprising system fibre or a laser pigtail fibre having a given mode field radius at an operating wavelength of the system, an optical route component for performing a function within the optical system, said optical route component forming part of the optical communications route and being connected to the system fibre or a laser pigtail fibre, and enclosed in a sealed container, the optical route component providing an optical output which passes along the system fibre or the laser pigtail fibre from the container, the output of the optical route component passing through a mode field transformer and thence along the system fibre or the laser pigtail fibre, the mode transformer including a section of optical fibre disposed at a location downstream of said container and serving to increase locally the mode field radius at said wavelength, the optical system being operated with an optical power density in the system fibre or the laser pigtail fibre above a level at which optical power induced damage can propagate in the system fibre or the laser pigtail fibre, the mode transformer reducing the optical power density for said given power level such that within the mode transformer the power density is reduced below the threshold level, so that in the event that optical power induced damage occurs in the system fibre or the laser pigtail fibre downstream of said mode transformer is prevented from propagating into the optical route component.

2. A system according to claim 1, wherein the mode converter and the system fibre or laser pigtail fibre are made of glass.

3. A system according to claim 1, wherein the section of optical fibre included in the mode converter includes a waist portion, wherein the diameter or cross sectional area of the waist portion is smaller than the diameter or cross sectional area of the system fibre of fibre pigtail.

4. A system according to claim 3, wherein said waist portion is symmetrically disposed about the longitudinal axis of the section of optical fibre included in the mode converter.

5. A system according to any one of the preceding claims, wherein at least part of said container and said mode field transformer are disposed within a housing.

6. A system according to claim 5, wherein said mode field transformer is readily accessible within said housing.

7. A system according to any one of the preceding claims, wherein said optical component includes an optical transmitter or an optical receiver or a fibre amplifier or a semiconductor amplifier or an arrayed waveguide grating or a planar silica waveguide.

8. An optical device for use in a system according to claim 1, said device including an optical route component for performing, in use, a function within the optical system, and being enclosed in a sealed container, the optical route component having a fibre pigtail for connection to a downstream optical fibre of said system, the optical route component providing an optical output having in said fibre pigtail a given mode field radius at an operating wavelength of said device; the device further including a mode field transformer including a section of optical fibre, said mode field transformer being disposed at a location downstream of said container between said container and said fibre pigtail, said mode field transformer having a mode field radius at said wavelength substantially larger than said given mode field radius and being sufficiently large to reduce at said location the optical power density of said optical output to below the threshold level at which optical power induced damage can occur in said pigtail fibre downstream of said mode field transformer, thereby, in the event that optical power induced damage occurs in the pigtail fibre, preventing the damage from propagating into the optical route component.

9. An optical communications route comprising a deployed system fibre at least 100 metres in length, the system having fibre having a given mode field radius at a given wavelength at which the fibre is designed to operate, said system fibre being

provided with a mode field transformer at each end of said fibre, each mode field transformer having at said wavelength a mode field radius at least three times said given mode field radius.

10. A plurality of mode field radius transformers disposed in an array, being arranged in use, so that each mode field transformer is connectable or spliceable with a respective system fibre in which at a given wavelength the mode field radius of an optical signal is x, each mode field radius transformer being arranged to increase the mode field radius of said optical signal, with respect to x, so that the power density of said optical signal in said mode field transformer is reduced to a level below the threshold required for optical power induced damage to propagate within the mode field transformer.

11. A method of protecting an optical communications route carrying a high power optical signal from catastrophic damage caused by the propagation of optical power induced damage along said route, said method including the steps of:

identifying a site where optical power induced damage is likely to be initiated and the likely path of damage propagation,

selecting a route component to be protected, disposed in said path, disposing a mode field radius transformer at a location in said optical communications route between said identified site and said selected component, the optical communications route having an optical fibre transmission path connecting said site and said component, the optical fibre having a given mode field radius at an operating wavelength of the signal, the power density of said optical signal in said fibre being at a level at which optical power induced damage can propagate in said fibre, said mode field radius transformer including a section of optical fibre to increase substantially the mode field radius with respect to said given mode field radius so that the optical power density in the mode field transformer is reduced to a level at which optical power induced damage cannot propagate through the mode field transformer, so that

optical power induced damage will be halted at said location before reaching said component.

12. A method of protecting an optical communications route carrying a high power optical signal from the propagation of optical power induced damage along the route, the route including an optical device including a route component for performing a function within the optical route, said route component being housed in a container, said method including the step of:

providing an optical fibre section at a location in said optical communications route outside said container, the optical fibre section being so dimensioned as to decrease the optical power density within said optical fibre section to a level below that at which catastrophic damage propagation is supported, so that optical power induced damage propagating in the route immediately downstream of said location will be halted at said location before reaching said container.

13. Use of a mode field transformer including a section of optical fibre to provide a significant localised increase in mode field radius from that of adjacent system fibre to serve as a barrier to the propagation of optical power induced optical damage from the system fibre through the mode field transformer.